Engaging Bodily with Video in Design

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ABSTRACT
Video is commonly used as a method for recording embodied interaction for purposes of analysis and design and has been proposed as a useful ‘material’ for interaction designers to engage with. But video is not a straightforward reproduction of embodied activity – in themselves video recordings ‘flatten’ the space of embodied interaction, they impose a perspective on unfolding action, and remove the embodied spatial and social context within which embodied interaction unfolds. This does not mean that video is not a useful medium with which to engage as part of a process of investigating and designing for embodied interaction – but crucially, it requires that as people attempting to engage with video, designers own bodies and bodily understandings must be engaged with and brought into play. This paper describes and reflects upon our experiences of engaging with video in two different activities as part of a larger research project investigating the design of gestural interfaces for a dental surgery context.

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Video, design, gesture

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
As the theme of this workshop makes clear, the body is emerging as of increasing importance to the practice and research of design in human-computer interaction (HCI) [1]. The ‘embodied turn’ opens many questions about how bodies are brought in to the design process. The focus of this paper is methodological: we focus on the use of video as a medium of representation of the body in a process of design. Our aim is not to simply argue for video as an appropriate format for recording people’s bodily interactions or simply to propose another method for engaging with video, but to reflect (methodologically) on how the body was brought into design through our own bodily engagement with video in one design project we have been involved in. Our interest is particularly on our own bodies, gestures and movements as we engaged with video and how it was through these embodied interactions that something came to be known about the interactions of the people represented in that video.

VIDEO IN DESIGN
Video is well suited as a recording medium for studying the detail of embodied interaction. In fields such as gesture studies [2] and interaction analysis [3] it is a standard medium for recording data. The use of video is also well established within the field of HCI, having been used as the basis for several seminal studies (e.g. [4][5]). Though usually embedded within larger design processes, video is primarily seen as a form of data, which allows analysis and re-presentation of users’ situated interactions [6]. HCI research has for the most part engaged with video as an analytic orientation.

Running alongside this, there has also been a stream of research within HCI, which has taken more of a design orientation to video. In this approach, video is treated less as ‘hard data’ and more as a ‘material for design’ [7]. Examples include the use of video within collaborative activities for identifying design themes of interest [7], as part of the ‘staging’ of acted out future scenarios of use [8][9], and as a medium for designers to ‘sketch’ bodily interactions [10]. Such activities often occur within the context of collaborative design workshop situations and perhaps because of this, there is an emphasis in much of this literature on presenting and describing methods for design process participants themselves. It is to this question that this paper is directed.

TWO EXAMPLES FROM A DESIGN PROJECT
The work presented here was carried out as part of an extended project investigating the design of gestural interfaces for a dental surgery context. The following two examples are taken from our work on this project.

Video Mirror
The ‘Video Mirror’ activity was a collaborative video analysis activity that we ran as part of a larger internal design workshop organized in collaboration with two other colleagues (the overall workshop is reported in [11]). Our focus here is on the Video Mirror activity itself and in particular:

- How this related to participants’ getting a feel for the way gestures relate to the work of the dental surgery
- Differences we observed between video projections of gestural activity and our attempts to ‘follow along’

The Video Mirror activity was used at the beginning of the workshop as a way to introduce participants to some of the findings from our earlier field studies about the work of the dentists and role of gestures in everyday practice.
A specific goal of the activity was to provide participants with a bodily understanding of the findings and to ground subsequent design activities.

Figure 1: Theme card (l) and associated video clip (r)

Each participant was provided with a different ‘theme card’, which was an abbreviated version of the themes of interaction that had been developed from our earlier studies. Theme cards were printed on A5 sized paper and consisted of a title, a brief summary and a written description of the action on an example video clip from the field studies (Figure 1).

The difficulty of mirroring

A majority of the participants had participated in previous collaborative analysis activities and therefore already had some familiarity with the themes that were presented. It might be expected from this that there would not be many new insights into the themes, but this was not the case. A big surprise was how difficult it actually was to mirror the gestures in the clips. This seemed due to the fact that whereas we were attempting to perform gestures that we saw projected on a screen, the people who had been video recorded were performing gestures situated within a context of activity. This highlighted aspects of the context that we had not previously paid a lot of attention to in terms of the role they play in structuring the actions and gestures within the dental surgery. Specifically, we became aware of and discussed the following points:

- **Posture:** Whereas the dentists were usually sitting in low stools, and the patients were usually lying down, the workshop participants were standing. Posture has a significant effect on how it feels to perform a gesture.

- **Direction of gaze:** Whereas participants stood looking at the video screen while mimicking the actions they saw there, the people portrayed in the clips directed their gaze at the person they were talking to, towards the place where they were working, and so on. Gaze and gesture are intimately linked in interaction.

- **Instruments and artefacts:** The dentist often held instruments in his hands while working and also while gesturing to the patient. For the participants, who did not have these artefacts, it was difficult to know how precisely to make their gestures. Instruments and artefacts help shape gestures.

- **Positioning in relation to others:** When the dentist made a gesture towards another person, or passed the instruments to someone else, the location of that other person gave a direction for them to orient to. Gestures are made in relation to other people and locations.

In developing these themes we had noticed several of these themes and indeed most of the theme cards that were provided to participants made explicit mention of them. Yet they passed with little comment when first introduced. It seems that we had not really felt what they meant until we tried to bring our own bodies into similar kinds of gestural relationships. A pertinent factor is that our prior engagement with the video data had been more traditional analytic modes of viewing and video while making written notes and then discussing observations with colleagues. Though analytic activities also require bodily engagement, it seems relevant that the video mirror activity brought our abilities for gestural mirroring and movement to the fore. We want to emphasize here that it was not the verisimilitude of the videos themselves that prompted our discussion of these themes, but that the activity allowed for a bodily exploration and experience of gesture and of the difficulties associated with that.

**Tracing Movements**

Later in the same project, we again made use of projected video as a way of getting a feel for the movements in a dental examination. At this time, we were working through a more conventional interaction analysis of one episode of work in a dental examination based on written transcripts of activity. The video that this analysis was based on had been taken from a tripod-mounted camera positioned at the foot of the dental chair, which meant that there was a stable framing of the image from the start...
to the end of the examination. As an experiment, we decided to make a tracing of the recorded movements of the dentist, assistant and patient as they interacted over the course of the forty minute examination.

In order to do this, a large (approximately A0 sized) sheet of paper was taped up on a wall and the video of the examination was projected onto it. The video was played through at normal speed and the movements on the video were traced with chalk as it played. The tracing was allowed to vary between tracing the line of movement of a single part of the dentist’s body (e.g. his right hand), outlining the bodies of the dentist, assistant and patient as they changed posture, and drawing the furnishings of the room that were visible on the image. The aim was simply to keep drawing or tracing the whole time. Once the tape had played through it was rewound and played again. This time tracing with a different coloured chalk. A version of the drawing that resulted is shown in Figure 3. The colours of the original drawing have been inverted in this version for legibility.

![Figure 3: Tracing of dental examination movements](image)

**Traces of analysis**

One way of presenting this drawing would be as a visualization of the movements of the people in the video, but this would miss the real worth of the activity. From the image above, we can see a large scribble of pink lines concentrated on an area to the left of centre. There is also a less-dense orange-line that ranges out from the same central spot, but over a larger area. Several outlines of people can also be seen, as well as the outlines of the furnishings of the room. Clearly, there is some relation between the drawing, the video that was projected, and the examination that was originally recorded, but this is not a one-to-one mapping. What we really see in the drawing are the *traces of the analyst’s movements* with chalk held out to the paper, struggling to follow along with the running video.

The real worth of this activity was not in the drawing that resulted, but in the process of drawing. The drawing reflects some accumulation of temporal activity. It helps one remember while one is drawing, but it does not let us see the shape or structure of that temporal activity in the final trace. We cannot see where the line starts or ends, or whether it moved quickly or slowly, or in what direction it moved. Whereas the drawing is a flattening of forty minutes of video into a single image, the process of drawing took place in real time and allowed the rhythms and regularities of the analyst’s own movement to be experienced as the video was followed along.

**A feeling for the space**

Because of a strong familiarity with the setting, the analyst had a strong feeling for how the movements in the video related to the physical layout of the surgery. As the movements of the projected video were traced, it was noticed that the movements and gestures of the dentist and assistant are located such that particular kinds of movements and gestures occur in predictable places within the surgery. The dentist moved in close behind the patient and leaned in when examining the teeth, sat straight-backed and focused on the computer when making a note, and moved to the side of the patient when explaining something about the teeth. This could be seen in the video as the tracing was being made, but the final drawing did not show it.

![Figure 4: ‘Movement-shapes’ of the dental examination](image)
his instruments and where he pointed to the x-ray. The shapes of the dentist and assistant also overlap in several places. One is in the centre of the drawing, which is the area of the patient’s mouth where the hands of the dentist and assistant worked when performing a scale and polish. Another is at the area behind the patient’s head where the dentist and assistant passed materials back and forth.

In drawing this picture, the analyst struggled with how to indicate some of the different kinds of movements. The lines curling around the mouth and the lines reaching out to the keyboard are intended to give an impression of the way the hands were held and the quality of the movements, but for other gestures it was not clear how to do this.

![Figure 5: 'Movement-bubbles' of the dental examination](image)

To address this, another diagram was developed which used a different way of indicating the movements. A piece of paper was laid over the movement-shapes diagram and ‘movement-bubbles’ were drawn indicating where the different areas of movement with words describing the quality of the movements (Figure 5).

**DISCUSSION AND CONCLUSIONS**

In terms of developing our design thinking in the dentist project, the activities described in this paper played an important role. In a very literal way, they helped us get a feel for the gestures and interactions of the dental surgery. This changed the way we saw the problem of gesture interface design from a question of what kind of gestures to use, to one of what kind of gestures to use, and where and when in the space of a dental examination. They are not just analytic observations, but also design moves, because they reframe relevant aspects of the setting for consideration in the design process. In reflecting on the reason that these activities were successful, it seems to us that a key ingredient is that they required our active bodily engagement and brought our own gestural abilities to the fore. This contrasts with how video is often discussed in HCI research, which is as a representation of the embodied movements in the video. Video is an attractive medium for recording and working with the movements of the body in design – but it needs to be brought into design through embodied engagement of design process participants. Video is a design material in this sense, and like any other material, it needs to be taken hold of and worked with.

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**REFERENCES**


Goodwin, C. Action and embodiment within situated human interaction. Journal of Pragmatics 32, 10 (Sep 2000), 1489-1522.


